MONTHLY WEATHER REVIEW,

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(General Weather Service of the United States.)

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In preparing this REVIEW the following data, received up to March 20th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 136 Signal Service stations and 15 Canadian stations, as telegraphed to this office; 182 monthly journals and 180 monthly means from the former, and 15 monthly means from the latter; reports from 5 Sunset stations; 240 monthly registers from Voluntary Observers; 56 monthly registers from United States Army Post Surgeons; Marine Records: International Simultaneous Observations; monthly reports from Voluntary Observers in, and the local Weather Services of, Iowa and Missouri, and of the Central Pacific Railway Co.; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

The mean pressure of the air over the United States and Canada, for the month of *February*, 1881, is shown by isobars on Chart No. II. The eastward movement of the area of high barometer (noted in the last month's REVIEW) has been still more marked during the present month, the region of maximum pressures having been transferred from the Mississippi valley to the Atlantic States, while the area of lowest barometer occupies the region covered by the maximum pressures of December, 1880. A glance at the chart at once reveals the effect of this redistribution of pressure upon the prevailing direction of the wind in the Gulf States, Tennessee, the Ohio valley and Lake region. On the Pacific coast, the highest pressures are over California, and the northerly winds along the coast would seem to indicate that the region of maximum barometer is over the ocean.

Departures from the Normal Values for the Month.—The region of greatest departure from the normal covers northeastern New York, Vermont and New Hampshire, being +0.15 at Albany and Mt. Washington and +0.16 at Burlington; along the New England coast it averages about +0.13, while the line of +0.10 runs from Cape May northwestward to Lake Superior. From this line of +0.10, in a southwesterly direction, it gradually decreases towards the line of no departure, which runs through Florida, Georgia, northern Alabama, Tennessee and Missouri. At Indianola the departure is —0.06 and at New Orleans —0.03. On the Pacific coast and in the Rocky Mountain region the departures are zero or quite small.

Barometric Ranges.—The range of pressure during the month has varied in the extremes from 0.36 inch at Key West to 1.72 inches at Burlington, Vt. Ranges of 1.00 and above were reported from stations in Washington Territory, Montana and Dakota, thence southward to Brownsville, Tex., and northeastward over the remaining sections of the country to the Atlantic coast, (except the East Gulf States,) with but the variance of a single station, viz.: Little Rock, Ark., 0.96. Throughout the territory included between the parallels of 30° and 47° and west of the 102nd meridian, the range varies from 0.32 at San Diego to 0.95 at Umatilla. Along both the Atlantic and Pacific coasts, the range increases with the latitude; along the southern boundary of the United States, the range increases quite rapidly from both California and Florida inward to the maximum in lower Texas. The smallest ranges occur at the southern stations—Key West and San Diego; the largest in the Upper Lake region and New England.

Areas of High Barometer.—Seven of these have been sufficiently marked to merit a brief description. The most remarkable was No. I, which occupied, in the last days of January, the Lake region, and continued in the same district until the 7th. It is, perhaps, due to this high area that the barometer for the month is generally above the mean east of the Mississippi River and the temperature below the mean for the same period. High areas Nos. IV and V, should, for the Pacific coast, be regarded as a single high pressure. As usual, all the minimum temperatures of the month are associated with the high barometers.

No. I was a continuation of No. VIII, briefly noticed in the January REVIEW. It was very remarkable for the persistence it exhibited in remaining over the Lake region, resisting successfully the development and advance of several depressions in the Southwest and extreme Northwest. At the morning report of the 1st the highest pressure on the chart extended from Manitoba to Lake Superior. During the day the barometer rose rapidly in the Lake region, Tennessee and the Ohio valley, accompanied by a "norther" in Texas and by northeasterly gales along the Atlantic coast from New Jersey to North Carolina. Cautionary Off-shore Signals displayed at Indianola and Galveston were justified by maximum velocities respectively, 44 N., and 25 NE. There was a great fall in temperature from the Ohio valley to the Rio Grande, averaging nearly 25°. The temperature east of the Rocky Mountains was generally below the mean, the greatest depression being in the Lake region. On the 2nd the highest barometer remained nearly central over Lake Huron; in the mean time a great fall in pressure was reported from the Northwest, accompanied by brisk to high southeast winds and by light snow which extended to Lake Michigan. At the morning observations minimum temperatures were recorded of —30° at Parry Sound, of —25° at Saugeen and —27° at Alpena. At the latter station the temperature was for the morning report 40° below the normal. The cold wave extended over the Atlantic States, the greatest fall in temperature taking place in the Carolinas and Georgia. On the 3rd the centre of the highest area moved slowly from Lake Huron to Lake Superior, due to a rise in pressure in the latter region and in the Northwest. The barometer in the Upper Lakes averaged more than one-half inch above the mean, the maximum reading reported being 30.71 at Marquette. On the 4th the highest pressure continued over Lakes Superior and Huron, accompanied by a great fall in the barometer, from the Lower Missouri Valley to Texas. The temperature remained low in the Lakes, where fair weather prevailed, with light winds mostly from the north. On the 5th the highest pressure was transferred to the Province of Ontario. During this day the following maximum barometers were observed: Rockliffe, 30.74, or 0.67 above the normal; Saugeen, 30.72, and Alpena 30.75, or 0.66 above the normal. During the day a great depression was developed, which extended from western Texas to Montana, and high southeast winds prevailed from the Northwest and Upper Lakes to the West Gulf coast. On the 6th the centre of the high area, with slowly increasing pressure, advanced into the St. Lawrence valley; the remarkably high isobar of 30.80 including this valley and the greater portion of the Middle States and New England. The pressure in these districts averaged more than 0.8 above the mean. The maximum reading at Burlington, Vt., was 30.97, or 0.88 above the normal. On the 7th the centre of the high area, with slightly diminishing pressure, moved into New England and along the Middle Atlantic coast. At the morning report the following observations were recorded at the several stations: Albany, 30.91; Burlington, 30.95. On the 8th and 9th, with rapidly diminishing pressure, this high area disappeared in advance of storm area No. III, then moving from the Gulf to the Lakes. During the regime of this high pressure, which was, as before noted, of remarkable persistence, the minimum temperatures of the month were generally reported from New England, Middle States, Lower Lake region and the eastern portion of the Upper Lakes and of Tennessee and the Ohio valley.

No. II—On the 9th the barometer rose slightly in Washington Territory and Oregon, which rise extended during the day eastward to the Missouri Valley. On the 10th a more rapid rise in pressure was reported from Manitoba, Dakota and Montana, and thence south to the Rio Grande. A "norther" was developed in Texas. Cautionary Off-shore Signals were justified by maximum velocities of 56 N. at Indianola and 26 N. at Galveston. On the 11th the pressure continued highest in Manitoba, but the greatest rise occurred in Texas; at Fort Garry the barometer, 30.58, was 0.46 above the normal. On the 12th the pressure from Montana and Dakota to the Rio Grande averaged 0.4 above the mean, and the prevailing temperature for the same region was from 20° to 25° below the mean. On the 13th the highest barometer continued in Manitoba, the reading at Fort Garry, 30.64, being 0.51 above the normal. On the 14th the region of highest pressure was transferred to the Middle States, accompanied by an extraordinary rise of the barometer in Nova Scotia and the Maritime Provinces, averaging more than 0.9 inch. At the morning observation the minimum temperatures of the month were reported from Madison, Davenport, Dubuque, La Crosse and Moorhead, being at the latter place —33°. On the 15th the centre of the high area had moved into Nova Scotia, and on the 16th disappeared beyond the coast in advance of low area No. V, then moving in an easterly track over the Lake region. During the continuance of this high area the lowest temperatures of the month were reported from nearly one half of the stations in the Southern States, and on the 11th from all the stations in southern California and

Arizona. In connection with this high area and low areas Nos. III and IV, Cautionary Signals were displayed on Lake Michigan, which will be more fully noticed in the description of those storms.

No. III.—On the 15th a great rise in pressure and corresponding fall in temperature occurred in the Southwest. Cautionary Off-shore Signals were displayed for a "norther" on the Texan coast, which were justified by maximum velocities of 36 N. at Indianola and 25 N. at Galveston. On the 16th the centre of high pressure moved into Illinois, where the barometer was in general more than 0.4 above the mean. On the 17th the high area was rapidly transferred to the Middle Atlantic coast in advance of low area No. VI, then developing in Texas. On the 18th it disappeared beyond Nova Scotia. In connection with this high pressure were generally noted the minimum temperatures of the month from Northern Texas, the Indian Territory, Arkansas, Missouri and Illinois.

No. IV.—On the 17th there was a marked rise of pressure on the Pacific Slope, which during the day extended in a southeasterly direction beyond the Rocky Mountains, the area of highest barometer being transferred to Texas and the Indian Territory. Cautionary Off-shore Signals ordered for a "norther" in Texas were justified by maximum velocities of 46 N. at Indianola and 26 N. at Galveston. On the 19th the high area moved over the Ohio valley and Lower Lakes, on the 20th advanced over the Middle States into New England, and on the 21st disappeared in advance of low area No. VII.

No. V.—The barometer remained above the mean on the Pacific coast on the 18th and 19th although the area of highest pressure had been transferred to Texas. On the 20th a slight rise took place in California, the barometer reading 30.4 at Red Bluff and at Sacramento. On the 21st the highest area moved into Oregon, Washington and Idado Tys. Maximum readings were reported at Roseburg of 30.48, or 0.41 above the normal, and at Boise City of 30.5, or 0.43 above the normal. On the 22nd from Washington Ty. to Dakota the barometer averaged more than 0.3 above the normal. On the 23rd the area of highest pressure was rapidly transferred to the Northwest and thence to the Upper Lake region. On the 24th, with diminishing pressure, this high barometer disappeared in advance of low area No. IX. During the continuance of Nos. IV and V on the Pacific coast no rain fell from the afternoon of the 18th until the 25th in California, Nevada, Utah and Arizona.

No. VI.—On the 24th there was a sharp rise in pressure in rear of low area No. IX. On the 25th the high barometer covered the Middle States. On the 26th this area disappeared beyond the New England coast.

No. VII.—On the 26th there was a very sharp rise of the barometer in Dakota and Manitoba in rear of low area No. X. The centre of the high area continued in Manitoba, during which time the centre of the low area moved very slowly to the eastward from northern Illinois to southern Michigan. On the 28th, with diminishing pressure, the highest area extended from Lake Superior to Iowa. Cautionary Northwest Signals displayed on Lake Michigan were justified by maximum velocities of 36 NW. at Milwaukee and 30 NW. at Grand Haven.

Areas of Low Barometer.—Ten such areas have had their tracks charted for the month of February, 1881. Of these, two—Nos. III and IV—appear to have been developed in the Gulf of Mexico. One only—No. II—with a defined track within the limits of the chart crossed the Rocky Mountains from the Pacific coast, and this disappeared in the Lower Missouri during the regime of high area No. I in the Lake region. Four—Nos. VII, VIII, IX and X—have their tracks first charted in the Northwest. Special attention is invited to the tracks of low areas Nos. III and IV, which are abnormal; a comparison made with the charts of the storm tracks for the month of February in previous years shows that not since the establishment of the Weather Service have any storms pursued for this month so northerly a course. These storms were both severe, No. IV being in some respects the most violent of the month. The great floods of February were all due to these two storms. The closest comparison is in February, 1874, when several low areas developing in the Southwest moved in a northeasterly track over the United States, but, as before stated, this office has no record of any storm tracks for February which pursued a course so nearly to the north. The maximum temperatures of the month are generally associated with the march of storm-centre No. X across the country.

No. I—which, at the morning report of the 1st, was central near Knoxville, Tenn., is a continuation of low-area No. IX described in January REVIEW. During the day it moved rapidly to the eastward and was accompanied by high northeasterly gales on the coast from New Jersey to North Carolina.

No. II.—On the 1st a great depression entered the North Pacific coast, the lowest barometer at Olympia, 29.41, being 0.52 below the normal, and, moving rapidly to the eastward during the day, the center of the low area crossed the Rocky Mountains. On the 2d there was a sharp fall in pressure in the Missouri valley, but the high barometer then prevailing over the Lakes did not yield and this depression, moving in a southeasterly track, disappeared as a distinct area of low barometer. During its passage over the Pacific slope very light rain fell in northern California,

but in Oregon and Washington Territory very heavy rains which continued for several days were reported; east of the Rocky Mountains, however, the precipitation was very slight.

No. III.—For several days before the 8th the barometer had been below the mean in the Southwest but with no well-defined center of depression. On this day the greatest fall was at New Orleans, where, at the midnight observation, the barometer was 29.61 or 0.52 below the normal. On the 9th the center of low-area moved in a northerly direction into Indiana, the barometer at Inanapolis 29.28, being 0.72 below the normal. On the 16th the centre of low area pursued its track to the north, but during the day there was a great fall in pressure over the Lower Lakes, Middle States and New England. Very heavy rain with consequent floods was reported from the Southern States and the Ohio valley. Cautionary Signals for this storm were ordered on the 8th from Mobile to Cedar Keys, on the 9th from Jacksonville to Wilmington and from Kittyhawk to Sandy Hook; these were generally justified by the following velocities: Mobile, 28 SW.; Pensacola, 28 SW.; Cedar Keys, 25 E.; Smithville. 28 SE.; Kittyhawk, 32 S.; Chincoteague, 36 SE.; Delaware Breakwater, 42 S.; Cape May, 39 SE. Cautionary Signals were ordered for Lake Michigan on the 9th and were justified by the following velocities: Grand Haven, 32 NW.; Milwaukee, 45 NE.

No. IV.—After the passage of low area No. III there was a sharp rise in pressure over the lower Mississippi valley, while along the Rio Grande the barometer continued very low. On the 10th the pressure in the Gulf began to yield in advance of low area No. IV, which was a secondary development in the Gulf of low area No. III; its centre at the midnight report of the 10th was located in western Louisiana. On the 11th, pursuing a track nearly parallel to No. III, its centre advanced into Illinois and Indiana, where the barometer was in general three-fourths of an inch below the mean. On the 12th, still continuing its northerly direction, the centre of low barometer was at the afternoon observation near Alpena, where the pressure of 29.22 was 0.9 below the normal; the depression then changed its path to the eastward, traversing on the 13th the St. Lawrence valley and New England. The heaviest rains accompanying this storm occurred in New England. High northeast gales, with heavy snow, were reported from the Northwest and Upper Lakes, and after the passage of the centre of depression in the Ohio valley and Lower Lakes a great fall occurred in temperature, accompanied by light snow and followed by clearing weather. Cautionary Signals for this storm were ordered on the 10th from New Orleans to Pensacola, on the 11th from Smithville, N. C., to Thatcher's Island, and on the 12th at Portland and Eastport. The signals on Lake Michigan were continued from the previous storm. These signals were generally justified by the following maximum velocities: New Orleans, 28 NW.; Mobile, 28 SW.; Pensacola, 31 SW.; Smithville, 34 SW.; Wilmington, 30 SW.; Macon, 33 SW.; Hatteras, 40 W.; Kittykawk, 42 S.; Cape Henry; 32 SW.; Norfolk, 33 SW.; Chincoteague, 40 SE.; Delaware Breakwater, 58 S.; Cape May, 50 S.; Barnegat, 36 S.; Sandy Hook, 28 W.; New York, 32 SE.; New London, 32 SE.; New Shoreham, 40 W.; Newport, 39 W.; Wood's Holl, 48 W.; Boston, 35 W.; Thatcher's Island, 40 NE.; Portland, 33 E.; Eastport, 40 SE. On the 12th the Cautionary Signals were changed to Cautionary Off-shore Signals from Smithville to Thatcher's Island, and were generally justified, both as to direction and as to velocity.

No. V.—At the morning report of the 15th the circulation of the winds and a slight fall in pressure indicated the formation of a low area in Missouri and Iowa, which development became by the afternoon better defined, the centre of depression being located near Davenport, and at midnight the low area had moved into Wisconsin near Madison. On the 16th there was a very sharp fall of pressure in the Lower Lakes, Middle States and New England, the centre of depression being in consequence transferred in sixteen hours from Madison to Eastport, Maine, and at the midnight observation the storm centre was near Sidney. Snow accompanied the passage of this storm over the Lower Lakes and New England, while in the Middle States to the south of its track light rains were reported. Cautionary Off-shore Signals were orderod for anticipated high winds in rear of this storm on the 16th from Chincoteague to Sandy Hook and were justified by the following velocities: Chincoteague, 32 W.; Delaware Breakwater, 54 NW.; Cape May, 55 NW.; Atlantic City, 25 NW.; Barnegat, 32 NW; Sandy Hook, 34 W.

No. VI.—On the 15th the pressure was below the mean on the Pacific slope, with a slight fall in mercury during the day. On the 16th the fall extended in a southeastern direction, but the greatest fall was in western Texas, still the barometer was lowest in Utah and a sharp rise was reported from the North Pacific region. The movement of the centre of the depression was for these two days so indefinite that no effort was made to chart its track, but at the morning report of the 17th the lowest barometers were reported from the Rio Grande valley, accompanied by light rain, southeasterly winds and great rises in temperature. During the day there was only a slight movement to the eastward but a considerable increase was developed in the energy of the storm. On the 18th the center of depression advanced in an easterly track to eastern Tennessee; at the end of the day a trough of low barometer extended over Tennessee and the Ohio valley, the Lower Lake region and the Middle States. On the 19th, continuing its easterly track, the low-area passed beyond the limits of the chart; it was accompanied by very heavy rain, especially in the Middle and New England States. Cautionary Signals were displayed for this storm on the Atlantic coast

on the 18th from Chincoteague to Sandy Hook, and were justified by the following maximum velocities: Chincoteague, 43 SW.; Delaware Breakwater, 48 SW.; Cape May, 43 S.; Barnegat, 32 SW. Cautionary Off-shore Signals were ordered on the 19th for anticipated high winds in rear of this storm from Chincoteague to Sandy Hook, and were generally justified both as to direction and as to velocity.

No. VII.—At the morning report of the 19th, a storm-centre was located in eastern Montana, which had, probably, on the previous day moved in a southeasterly direction from the Saskatchewan valley. During this and the following day, developing but slight energy, it moved over the Northwest and Upper Lakes; thus far it had been accompained by occasional and very light snow and by gentle winds, but on the night of the 20th and 21st there was a very sharp fall of mercury on the Middle Atlantic coast, and the centre of depression was transferred in eight hours from the straits of Mackinac to the east Maryland coast. During the day, it is inferred from the fall of the barometer and the circulation of the winds on the North Atlantic coast that the centre of depression moved in a northeasterly track as charted. This storm exhibited but slight energy within the limits of the United States and no signals were displayed during its progress.

No. VIII.—On the 20th there was a sharp fall in pressure in Idaho and Montana, which, on the 21st, extended over the Northwest and Upper Lake region. This depression followed two days after low-area No. VIII and had its general characteristics; it was in these districts accompanied by slight precipitation and by winds ranging from gentle to brisk. It pursued, on the 22nd and 23rd, a course nearly due east over the province of Ontario, the St. Lawrence valley, Maine and Nova Scotia. After the passage of centre of low-area brisk to high northwest winds prevailed on the Middle Atlantic and New England coasts, and, later, it was followed by north to northeast gales on the North Carolina coast. Cautionary Signals were ordered on the 22nd from Chincoteague to Portland, Me., and on the 23rd from Norfolk to Smithville. These were generally justified by the following maximum velocities: Thatcher's Island, 46 NW.; Boston, 32 NW.; Wood's Holl, 40 NW.; Newport, 28 NW.; New Shoreham, 44 NW.; New London, 25 NW.; New York, 27 NW.; Sandy Hook, 36 N.; Barnegat, 33 NW.; Cape May, 44 NW.; Delaware Breakwater, 40 NW.; Chincoteague, 38 NW.; Cape Henry, 36 N.; Kittyhawk, 40 N.; Hatteras, 36 NE.; Macon, 25 N. Cautionary Signals were changed to Off-shore Signals on the 23rd from Chincoteague to Portland and were generally justified, both as to direction and to velocity.

No. IX.—On the 23rd there was a great fall of pressure in the Saskatchewan valley, which fall extended into Montana, Dakota and Minnesota. At the morning report of the 24th the centre of depression is found in eastern Dakota. From the morning to the afternoon observation the centre of the low area was rapidly transferred in a southeasterly track to a point near Keokuk, then on the night of the 24th and 25th the storm centre moved across the Ohio valley and Middle States to the Atlantic coast. This storm was accompanied by light snow, confined, as a rule, to the Lake region and the Middle States. No dangerous winds were reported.

No. X.—This low area, as well as the three preceding, was first evident in the British possessions north of the Upper Missouri valley. There was a sharp fall in pressure in Washington Ty. on the 24th, which leads to the inference that the centre of this depression may have crossed British Columbia on that day. On the 25th the depression pursued a southeasterly track. As charted on the 26th, until the afternoon report, the centre of the low area moved down the Missouri valley. At the afternoon observation a great depression extended from the Upper Lakes to the Rio Grande; the lowest barometer was reported from Leavenworth, 29.38, which was 0.62 below the normal. The track of the low area then turned to the east, and at midnight the centre was near Keokuk, with a deep trough-like depression extending from Lake Michigan to the West Gulf coast. Heavy rain fell to the east of this depression. On the 27th the low area moved very slowly to the east, but developed an immense increase of energy during the day; at the midnight observation the barometers were at Grand Haven, 29.25; at Detroit, 29.31; at Port Huron, 29.26, or below the normal respectively 0.76, 0.70, 0.71. Very heavy snow, with high northeast to northwest winds, prevailed in the Upper Lakes. During the night of the 27th and 28th, although the centre of the low area remained in southern Michigan, there was a very great fall of mercury on the Middle Atlantic coast. At the morning observation of the 28th the lowest barometer was at Port Huron, 29.36, or 0.62 below the normal; but a depression at the same hour extended from Buffalo to Washington, averaging 0.6 below the normal. From the morning to the afternoon the centre of the lowest area was transferred to the New Jersey coast, although at the p. m. report an independent depression was charted with its centre near Detroit. The low area then moved in a track to the north of east beyond the coast. Cautionary Signals were displayed for this storm on the 26th for Lake Michigan, and from Cape Henry to Sandy Hook; on the 27th from Smithville to Kittyhawk and from New York to New London; and on the 28th from Block Island to Portland. These signals were justified by the following maximum velocities: Milwaukee, 36 NW.; Grand Haven, 32 SE.; Smithville, 32 S.; Macon, 32 S.; Hatteras, 38 SE.; Kittyhawk, 39 S.; Chincoteague, 39 SE.; Delaware Breakwater, 36 S.; Cape May, 32 S.; Barnegat, 27 S.; New York, 25 NE.; New London, 36 S.; New Shoreham, 32 NW.; Wood's Holl, 52 SE.; Boston, 26 NE.; Thatcher's,

36 NE. These signals were changed to Cautionary Northwest Signals on Lake Michigan on the 27th. Cautionary Off-shore Signals were ordered on the 28th from Smithville to Sandy Hook, and were generally justified, both as to velocity and direction, as follows: Macon, 26 NW.; Hatteras, 32 NW.; Kittyhawk, 26 NW.; Cape Henry, 28 NW.; Chincoteague, 39 NW.; Delaware Breakwater, 44 N.; Cape May, 52 NW.: Atlantic City, 27 NW.; Barnegat, 37 NW.; Sandy Hook, 40 W.

INTERNATIONAL METEOROLOGY.

Two International charts accompany the present REVIEW. No. IV is for the month of *January*, 1881. No. V is for the month of *March*, 1877, and is published in accordance with the explanation given in the opening paragraph under International Meteorology in the January, 1881, REVIEW.

Chart No. IV, for the month of January, 1881, indicates as well as is at present (March 16, 1881) possible the general course taken by the most prominent storm-areas over the North Atlantic Ocean and adjacent land areas during that month. Nos. II, V and VIII are continuations of low areas Nos. I, V and VII, respectively, of chart No. I for January, 1881. Nos. I, III, IV, VI, VII and IX are prominent low areas appearing during the month on the European coast and which have been traced from the daily charts published by the various meteorological offices of Europe. The most notable meteorological feature of the month occurring over the North Atlantic, between the parallels of 35 and 55, was the remarkably low barometric readings experienced, especially from the 4th to the 9th over the region marked by area No. II, and from the 17th to the 31st over the regions marked by areas Nos. VII and VIII. During these periods the barometer fell below 29.0 or 736.6 on nine days, and on the 26th 28.37 or 720.6 was experienced in mid-ocean. As the area of low barometer No. VIII progressed slowly eastward during the 22nd, 23rd and 24th it so increased in extent that from the 25th to the end of the month it included not only the whole region under consideration but extended its influence over the greater part of Europe; thus on the 28th the pressure at Cape Breton was 29.16, in mid-ocean about 29.24, near the centre of depression about 28.9, at Mullaghmore 28.84, and at Gris-Nez 28.89. On the 29th the barometer at Mullaghmore fell to 28.65. The individual storms will be treated of at length on the presentation of Chart No. VI for this month; in the mean time the following characteristics of the weather over eastern North America, the portion of the North Atlantic under consideration, and western Europe may be grouped together with interest. Attending the low pressures over the ocean gales were reported on 28 days and severe or violent gales or hurricane winds on 12 days. The general direction of the storm winds was SE. or ENE. to the eastward of the 40th meridian and northwesterly to the westward, the latter to the north of the 40th parallel being accompanied by severe snow-squalls and freezing temperatures throughout the first and last decades of the month. Over the eastern half of the United States high pressures predominated, and exceptionally cold northerly winds generally prevailed from Vera Cruz, Mexico, northeastward along the entire Gulf and Atlantic coasts. In Europe severe storms, accompanied by unusually heavy falls of snow or rain, were experienced in all the countries bordering upon the Atlantic. The severe frost which prevailed from the 7th to the 26th and the heavy snow-storm and severe gales, which culminated on the 18th and 19th over the British Isles, are perhaps without precedent. The heavy snows in Paris and inundations in Spain may also be instanced as remarkably severe.

Chart No V—shows the mean pressure, temperature and wind force and the prevailing direction of the wind at 7.35 a. m. Washington, or 0.43 p. m. Greenwich, mean time, for the month of *March*, 1877, over the Northern, and at certain isolated stations in the Southern, hemisphere. During this month the Atlantic area of low pressure (as compared with January and February) is found more to the eastward, the lowest mean barometer (29.59 or 751.6) being that of Tromso, in northern Norway, while Thorshaven is 29.62 (752.3,) Stykkisholm, 29.66 (753.4,) and Godthaab, 29.74 (755.4.) The highest monthly mean is 30.24, or 768.1, at Barnaul, while the following means indicate other regions of comparatively high pressure: Angra, 30.17 (766.3,) Montgomery, Ala., 30.12 (764.8,) and Ft. Garry, Manitoba, 30.16 (766.0.) These give a barometric range in the monthly mean pressure of 0.65 inch, as compared with 1.28 in January, and 0.94 in February. The highest and lowest barometric readings, as reduced to sea level, were 30.70, or 779.8, at Barnaul on the 10th, and 28.76, or 730.5, at Thorshaven on the 12th, giving a total barometric range of 1.94 inches. The region of greatest continued cold is in Hudson's Bay territory, York Factory having a monthly mean of —22° F.; the lowest single reading observed during the month, —34° F., occurred at this station on the 4th, and again on the 11th. The prevailing direction of the wind was *north* or *westerly* over the North American continent, except *southerly* along the eastern slope of the Rocky Mountains, and *westerly* over Europe, trending to *southerly* over northern Asia, while *easterly* winds prevailed at Godthaab and Stykkisholm. In comparing the present with the preceding month, the most marked changes are found to be an increase in pressure from the Canadian Maritime Provinces (Sydney 0.19 inch and Heart's Content 0.36) to Godthaab (0.18), Stykkisholm (0.20) and northern Europe Tromso 0.15 inch), and a decrease elsewhere, amounting to 0.20 inch in Siberia, southwestern Europe and interior of the North American continent. The temperature changes show a decided fall over the last region,